**Innovation Diploma Plus High School Teacher**: Daisy Davydov

**\* GENERAL INFORMATION**

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| **Subject** | Global History (Global 1) |
| **Unit of Study** | Early People, the Neolithic Revolution, & River Valley Civilizations |
| **Instructional Setting** | Classroom |

# \* STANDARDS AND OBJECTIVES

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| **Standards** | *New York State Common Core Standards*  RH 11-12.1  RH 11-12.3  WHST 9-10.8 |
| **Danielson** | 1e; 1f; 2a; 2b; 2c; 3a; 3b; 3c; 3d |
| **Essential Question** | What lasting impression and/or impacts does the past have on the present? |
| **Lesson Objective** | Students will learn how irrigation systems move water from one location to others by creating an irrigation system out of everyday items in group of 4-5. |

**\* MATERIALS AND RESOURCES**

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| **Instructional Materials** | * Student Resource Sheet (used in previous lesson) * Student Worksheets (used in previous lesson and in this lesson) * Water basin and water for testing student irrigation systems * One set of materials for each group of students:   Straws, cardboard or paper cups or bowls, clay, tubes, aluminum foil, rubber bands, tape, jars, toothpicks, glue, paperclips, plastic piping, tape, and other materials |
| **Resources** | http://tryengineering.org/lessons/irrigationideas.pdf  <https://water.usgs.gov/edu/irquicklook.html>  http://www.waterencyclopedia.com/Hy-La/Irrigation-Systems-Ancient.html |

# (TURN OVER)

# \* INSTRUCTIONAL PLAN

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| **Identification of**  **Student Prerequisite**  **Skills/Content** | Students have read about specific river valley civilizations prior to this lesson. Irrigation systems were mentioned but how they worked (or were engineered) was not the focus of those lessons. Students have annotated text before according to the 3 reads strategy that we’ve been practicing and have created questions on the irrigation reading as they read along. |
| **Differentiating Instruction** | Sharing and grouping based on mixed abilities/ backgrounds (ELLs, SWDs, low performing, and high performing) |
| **Do Now** | **Think-Pair-Share**  Think back to the lesson we completed and explain why water was such an important resource in river valley civilizations.   * Write your answer and share it with your partner. * How is your answer similar to your partner’s? * How is your answer different than your partner’s? |
| **Mini Lesson: Presentation**  **of New Information and**  **Modeling** | [PowerPoint on Ethical Implications](https://docs.google.com/presentation/d/1qF7vEmCebMzw4DcQl-rVWgZzyjaqUDegPidcCz364OU/edit?usp=sharing)  With Modeling and Rubric |
| **Independent and/or**  **Group Activity** | Independent: The Do Now , Mini Lesson Question, & Closing (EQ Reflection)  Group: Building the Irrigation System using the materials and responding to the student worksheet |
| **Culminating or Closing**  **Procedure /Activity /Event** | Closing: reflection based on unit’s essential question.  Referring back to the unit’s essential question: “What lasting impression and/or impacts does the past have on the present?”  In other words, think about the past and how river valley civilizations used irrigation systems while also thinking about the present and how we continue to use irrigation systems today. Although technology has evolved has the reasons for the use of irrigation systems changed? Write one paragraph on this the essential question reflection |
| **Student Assessment** | Formative:   * Do Now response * Mini Lesson question * Group Activity Sheet & Presentation using Rubric * Closing Reflection |

(Adapted from <http://tryengineering.org/lessons/irrigationideas.pdf> )

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Student Resource: Close Reading**

**What is Irrigation?**

Irrigation is a system that artificially routes water to an area where it is not naturally present. More common applications are in providing water to remote or dry land for growing crops. Irrigation is frequently used to compensate for periods of anticipated or emergency drought, but also is used to protect plants against frost. Irrigation systems are also used to help suppress the growth of weeds in rice fields. There are many different irrigation techniques to route water from a source to its destination. Usually, uniformity in water placement is a goal, especially for growing crops.

**Irrigation History**

Archaeologists have found evidence of irrigation at work in Mesopotamia and Egypt as far back as the 6th millennium BCE, where barley was being grown in areas where the natural rainfall was inconsistent or not necessary sufficient to support the crop. In the Zana Valley of the Andes Mountains in Peru, archaeologists have found the remains of three irrigation canals which were radiocarbon dated to place their development at the 4th millennium BCE, the 3rd millennium BCE, and the 9th century CE. At the moment, these canals are considered the earliest examples of irrigation systems found. In addition, advanced irrigation and water storage systems were developed by the Indus Valley Civilization in Pakistan and North India. Because extensive agriculture was required, an innovative network of canals was developed to support irrigation. There also is evidence of the ancient Egyptian pharaoh Amenemhet III in the twelfth dynasty using the natural lake of the Faiyum Oasis as a reservoir to store water to be used during dry seasons. The lake would swell annually due to the annual flooding of the Nile River. Egypt received little rainfall, so the Nile was a logical source of water.

**Roman Aqueducts**

The ancient Romans constructed many aqueducts to route water to cities and other sites. These aqueducts are considered to be one of the greatest engineering feats of the ancient world. Many of the ancient aqueducts are still in use today. They served several functions including providing potable water and supplying water to baths and fountains. Water was then routed into the sewers, where they helped remove waste matter.

**Studen Names In Your Group \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Student Worksheet: Design Your Own Irrigation System**

You are part of a team of engineers who have been given the challenge of developing an irrigation system that will carry two cups of water a distance of three feet and split the water into two separate destination containers. If your system works, you'll end up with exactly one cup of water in each of your destination containers. How you accomplish the task is up to your team!

**Planning Stage**

Meet as a team and discuss the problem you need to solve. Then develop and agree on a design for your irrigation system. You have been provided with many items you may use to construct your system. As a team, come up with a plan, and draw your design in the box below. Be sure to indicate the materials you anticipate using. Present your design to the class. You may choose to revise your team’s plan after you receive feedback from class.

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| Materials Required: |

**Student Names In Your Group: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Use this worksheet to evaluate your team's results:**

1. Did you succeed in creating an irrigation system to split the two cups of water into two separate destination containers? What was your best result?

2. If your system failed, what do you think went wrong?

3. What was unique about either the design or construction of the irrigation system that had the best results on this challenge in your classroom? (Think about the irrigation methods- from powerpoint- that your group chose to use)

4. Did you decide to revise your original design while in the construction phase? Why? How?

5. Do you think that engineers have to adapt their original plans during the construction of systems or products? Why might they?

6. If you had to do it all over again, how would your planned design change? Why?

7. How do you think your design would have had to change if the material you were distributing was honey?

8. Do you think you would have been able to complete this project easier if you were working alone? Explain…